

line 11-12), then the full name of nylon waterproof zipper (10) is already simplified as nylon zipper (10) throughout the specification. While the waterproof is an expected specific function of the nylon zipper product, therefore, in the claim 9 line 1, a “waterproof zipper” is to attribute the expected products to the scope that it belonged to.

While a critical change occurred to the nylon zipper (10) when it was “coated with PU gel (37)” (Please see the original specification page 8 line 6), then a nylon zipper (10’’) is first described in page 9 line 17 since the heating step (28) is executed on such coated PU gel nylon zipper (10’’), which is initially different from the nylon zipper (10) in question.

It means the nylon zipper (10’’) is not only completed a first stage “coating and adhering effect between the PU gel 37 and the fastener strips 11, 12.” (Please see page 8 line 12) but also is processing through a second stage, and the back side of the nylon zipper (10’’) is already added with a thickness of 2~5 mil single layer PU film, may be a transparent, semi-transparent or a colored PU film. Even a coarse surface of a release paper separated from the PU film may influence the transparency of the PU film on the backside of the nylon zipper (10’’). Therefore, the nylon zipper (10’’) is finally different from the nylon zipper (10). And, an unglued zipper 10’ is also mentioned in page 10 lines 23-25 for specifically designating a zipper is preheated to 70~120 °C suitable for adhering to the PU gel (37) in the first embodiment of the present invention. While the fastener strips (11,12) remained the same numerals throughout all the specification due to it was separated from each other by latter cutting step (29). Since the fastener strips (11,12) before heating (28) step are substantially

undivided parts of the nylon zipper (10) or nylon zipper (10''); therefore, the same numerals (11,12) refer to the same parts of the nylon zipper (10, 10', or 10''). After cutting step (29), the original single sheet waterproof layer is cut into a left waterproof layer 17 and a right waterproof layer (18). (please see page 10 lines 2-3)

Since the first stage can be repeated 1~3 times, (Please see page 8 line 11), through which, it means whenever the nylon zipper (10) passing the gluing step, a mixed PU gel and solvent glued to one side of the nylon zipper must be ready for a drying step: "In drying step (24), the fastener strips (11, 12) are heated in the heating box (40) so that solvent of the PU gel 37 vaporizes. The temperature of the drying box is about 120°C~180°C. The heating time is determined by temperature, for example, 12 second in 150°C." (Please see page 8 lines 2~5). Therefore, no matter the first stage is repeated 1,2 or 3 times, the drying step (24) is already included in such repeated first stage 1,2 or 3 times to vaporize the solvent, therefore, the drying step (24) of the first stage is not incorporated into the heating step (28) of the second stage.

Secondly, the present invention is restricted to a nylon zipper, for example, ammonolysis process for chemically recycling nylon 6 and nylon 66 can recover the costly monomer. And as described in page 7 lines 20-21 and lines 9-11 "The PU gel includes PU adhesive and solvent. If material of the fastener strips are different from the polyester fibers the PU gel can be replaced by other adhesives." "The main component of the glue is di-thermal liquid bridging polyester urethane resin (i. e., PU gel) mixed with bridging agent."

Since the solvent is vaporized by a drying step (24), therefore, the main component of PU gel or PU film can also be recycled, for instance, as described in US5,185,380 col.1 lines 65-66 "cut foams consisting, for example, of polyether-polyols and isocyanates, can be thermally pressed to shaped articles."(encl.1) Such as described in the page 10 lines 27-28 of the specification of the present invention "base material polymer (polyester polyhydric alcohol or acrylic acid polyhydric alcohol) is more easily thermally compressible than polyether polyol.(encl. 2)

Thirdly, Norvell (US 5,386,616) taught a thin flexible polymer coating 32a, 32b, 34a, 34b on the respective inside and outside surfaces of each of the tapes 12, 14 cause water to bead-up and roll off the tape. That is, water can be repellent by both faces of the tape. Though a minimal cross-sectional dimension is emphasized for these two-faced polymer coating, but it is substantially a "sandwiched" tape with one or more layers of polyurethane 2 to 4 mils thick "thin, flexible" coating on both faces to repel the water at the same time. Therefore, when water flow through the zipper with a gap between the stringer tapes when closed of about 0.5 mm or less; but sufficient space between the zipper elements (16) and the coating to permit the free movement of the slider (18) (e.g. a gap of 1 to 3 mils should normally be sufficient). Even the two-faced polymer coating on the tape hardly resist the water penetration on the spot when a gap is timely required up to 3 mils in use.

Therefore, a thickness of 1.5 mil sheet (when added with adhesive, its thickness can be increased up to 4~6 mils) according to US 3,953,566, a tetrafluoroethylene polymer in a porous form with a complicated paste forming step of the same as disclosed in col. 1 line 58~ col. 2 line 6 of '566, but "These expanded, amorphous-locked materials have permeabilities to gases, and to liquids in some cases"

and " permeabilities to liquids of the expanded, amorphous-locked materials described herein are higher, in an analogous way, than corresponding permeabilities to liquids of the conventional materials" are described in col. 4 lines 55~57 and col. 5 lines 7~11 of '566. Otherwise, the two-faced polymer coating could not further works out water penetration.

And, "a serious source of water penetration emerges if the sealing tape begins to separate from the stringer tapes" described in col. 5, lines 56~58 of US 5,386,616 can be a proof that Norvell concerned the permeabilities to liquid of the sealing tapes (36,38) with such "film" (40a,40b) patented by '566 on its surface.

Fourthly, Press (US 6,105,214) taught that a PU film can be directly laminated to the fabric stringer tapes (14,16). If desired, additional layers of PU and the like can be easily laminated to the initial PU film coating. Thereby, the first laminated PU film, though described in col. 3 line 29 as a solid sheet, but may preferably be a low melt material having Shore A hardness of less than or equal to about 80 PTPU. (please see col. 6 lines 1,7-9,32-33 of '214)

The laminated layer (26) is not sufficient to repel water such as fluorocarbon treatment may be treated to the inner surface (18). (please see col. 4 lines 58-60 of '214) Or, one surface of PU film may be treated at station (32) with a hot melt adhesive, PU adhesive or bonding material to the PU film before lamination. (Please see col. 4 line 60, col. 5 lines 33-35 of '214). Or the PU film may be cured. (Please see col. 7 line24). A curing step may also be desired after laminating and could be performed at station (40) or in any other convenient manner. (please see col. 5 line 64-67 of '214)

It was described in col. 6 lines 61-65 of '214, such PU film is attributed to thermoplastic hot melt adhesive films. And also described in col. 7 lines 17-19 of '214 "Various types and grades of

PU and other thermoplastic films are readily available and should be selected depending upon the desired characteristics of the final slide fastener product. “

Since thermoplastic films are insufficiently hardened, therefore, many processes may be added to finish the PU film of '214 as mentioned above.

Even pigments may be added to the PU of '214, but it is not able to be transparent to show some pre-shaped pattern or texture inside the film. (please see col. 7 line 4 of '214 and Figs. 2B, 2C of the present invention)

According to US 7,048,966 col. 9 lines 57-59 “If the prepolymer has little or no cross-linking, the resultant elastomer can be thermoplastic. With cross-linking, however, the film can develop significant strength.” And col. 10 lines 21-24 of '966 disclosed “Commercially available perpolymers have a significant degree of cross-linking and thus, soon after the reaction is initiated, the emulsion changes its rheology from a true liquid to a gel.” (encl. 3)

The present invention initially provides a di-thermal liquid bridging polyester urethane resin (i.e. PU gel) mixed with bridging agent at a gluing step (22). Backside of a nylon zipper (10) only passes across a gel storage tank (34) with a gluing roller (35) to adhere with PU gel (37) in the gel storage tank. To facilitate such a gluing and expected cross-linking process, a pressing roller (36) with a rotation direction opposite to the gluing roller (35) is provided. That is arranged for the one side of nylon zipper (10) to glue and process forward with high feed accuracy at exact positioning and lower inertia, whereby the pressing roller (36) and the gluing roller (35) are rotated in the reverse direction, such fastener strips (11,12) one side glued and processed forward, both gluing roller (35) and

pressing roller (36) exert pressure to the one side glued nylon zipper evenly can be expected to preserve the glued PU gel in the fastener strips (11,12). Otherwise, the PU gel (37) may flow away before attaching to the fastener strips (11,12).

In contrast with the pressing roller (36) and gluing roller (35), a pull force is exerted by a pair of guide rollers (41,42), in which, the rollers (41) is designated as an active roller, and a pair of rollers (56,57), in which, the roller (56) is designated as a driving roller. Both of the active roller (41) or driving roller (56) is arranged at the same side as the gluing roller (35). Thereby, one side glued nylon zipper can be processed forward as described in page 7 line 30 "extending and smoothing the fastener strips (11,12) with the guide rollers".

Following the gluing step (22), a pressing step (23) is performed by a pair of pressing rollers (38,39) then proceeded through a drying step (23), "the PU gel is pressed into the polyester fibers of the fastener strips (11,12)...without increasing the thickness of the fastener strips (11,12)" but "the solvent of the PU gel (37) vaporize" is further performed. (please see page 7 lines 23~26, page 8 line 3) and this process can be repeated 1~3 times as desired. As expected, though the PU gel is combined with the polyester fibers 3 times, the thickness of the fastener strips (11,12) is not increased throughout the first stage due to the pressing rollers (36, 38,39) continually exert pressure to the one side glued nylon zipper and the solvent is further vaporized.

Until a single layer compound film (51) has a thickness about 2~5 mils and a width equal to the nylon zipper (10), for example, can be added with agents for preventing yellowing to form a transparent film, separated from a release paper and then "pressed by the rollers (47,48) tightly adhered to the PU gel (37) at the backside of the fastener

strips “(please see page 8 lines 27-30).

A heating step (28) is executed through a pre-heated heating box (52) with 120~200 °C temperature and 12-17 seconds duration, “the PU film (51) is combined with the PU gel by thermal plastics...they will plasticize and then combine.” (please see page 9 lines 21-23) and an extruding device composed by an upper press roller (54) and a lower press roller (53) may be added to the end of the heating box (52) for pressing the backsides of the fastener strips (11,12) formed with waterproof layers (17,18), the waterproof layers and the fastener strips (11,12) are firmly secured. (please see page 9 lines 23-29).

Therefore, the heating step (28) is nearly given a finished product of the waterproof nylon zipper, after a cutting step (29), the fastener strips (11,12) are divided and then guided out by guide rollers (56,57), these two guide rollers (56,57) can also used to replace the press rollers (53,54).

To facilitate the Examiner understand the benefit, for example, a transparent film can be pre-shaped with textures or patterns in the fourth embodiment of the present invention. The first stage of the first embodiment is simplified to an initial gluing step (22) as denoted in Fig. 11, since “coated with PU gel (37)” (Please see the original specification page 8 line 6) to form a nylon zipper (10”) can be ready for an adhering step (27) of the second stage of the first embodiment; therefore, in the fourth embodiment, the drying step included in the gluing step (22) (i.e. the first stage) based on the first stage of the first embodiment can be the antecedent basis of “between steps (d) and (e)” of claims 12-14, then the film is to proceed through a printing step (221) and a press step (222) prior to an adhering step (27). And then an inner surface of the film is printed with pattern (512), convex or concave textures or protrusion texture (513).

Since the claim 9 is maintained as only one independent claim of the present invention, so a drying step (23) of the first embodiment is incorporated into the gluing step (22) of the fourth embodiment, but not the adhering step (27). The difference between a gluing step and an adhering step is already discussed in detail as mentioned above.

As depicted in Figs. 12 and 13 of the present invention, the inner layer 18a of the waterproof layer 18 can be increased the thickness of the fastener strips at least $1/3$ to $1/2$ due to the protrusion textures etc. formed in the inner surface of the film. And the inner texture or pattern of the waterproof layer can prevent from scraping and have the function of counterfeit-proof.(Please see page 13 lines 9-11)

Fifthly, Klein (US 2,768,922) taught a thermoplastic vinyl resin film (24) coated paper (27) is fed from the roll (28) together with a porous woven cotton fabric tape (30) wound on roll (29) pass through a threading aligning and tensioning device (31). Whereby the film (24) narrower than the tape (30) and disposed against one side of the tape (30) is laminated and aligned then fed between heating roller (32) and pressure roller (33) and then the film is adhered to the tape. It required 20 pounds per square inch pressure and a temperature between 300~350 °F, otherwise a common paper may be burnt. And the tape 30 coated with film (24) on one side is then fed through cooling rollers (34,35) to solidify the film on the tape. The cooled film and tape are passed over tensioning means (36) and the paper strip is stripped from the film (24) and the tape (30). But the beaded edge (20), which is further secured by clamping fastener elements (19) thereof, of this tape (30) is not covered by the film. While in the present invention the nylon waterproof zipper (10) includes two symmetric fastener strips (11,12) are initially formed, only the back

surface is combined with a thin waterproof layer (17,18) so that the water will not drain into the fastener strips (11,12). (please see page 6 lines 24-25)

Sixthly, Huang (US 6,676,534) taught a skived side edge (43) of segment (S1) is placed on top of reinforced side edge (70) of segment (S2), as shown in FIG. 21 and pressed onto segment (S2) then cut on both ends to provide the leading edge and trailing edges (77) and (78),It should be particularly noted that the upper area of polyurethane layer of segment (S2) inwardly of the recessed side edges is embossed with depressed indicia (I), the embossing process densities the polyurethane layer (P2) so as to reduce stretching of the second segment and thereby cooperates with strip (S1) to increase the hoop strength of the composite strip (S). But, the indicia (I) such as the name of the manufacturer are restricted to only one bottom line of several letters arranged thereon, most S1 on top of S2 is to form friction enhancing pattern Friction enhancing pattern includes a large number of small repetitive shapes (59), such as squares or diamonds, with the interstices (60) of these shapes cooperating to collect water can be readily removed by wiping the grip with a towel, further resists slippage between grip G and a golfer's hands.

But, in the present invention, the inner surface of the PU film (51) can be printed with pattern (512) by screen printing. Convex or concave textures can also be printed on the inner surface of the PU film. Since the waterproof layer is transparent, the pattern or texture is clear and it can be identified easily. Moreover, the transparent texture (513) can be presented as protrusion texture. And, the patterns (512) or textures (513) will not disappear out due to the friction or scraping. (please see page 12, lines 4-11) the inner texture or pattern of the waterproof layer can prevent from scraping and have the function of counterfeit-proof. (please see page 13 lines 9-11). If

desired, such inner layer can be increased the thickness of the fastener strips at least 1/3 to 1/2 due to a protrusion texture formed in the inner surface of the film. (Please see Figs. 12 and 13 of the present invention and page 13, lines 9-11)

Seventhly, Tolbert (US 6,579,403) taught first and second fabrics (52, 56) opposing face-to-face contact, FIG. 6 illustrates the fabrics (52 and 56) overlapping completely, or they can overlap only a portion of each other. Adhesive application station (60) directs a bead of molten curable hot melt adhesive along a simulated sewing path between the mated fabric surfaces of fabric layers (52 and 56) to form an adhesive seam. The fabric structure, designed generally as (62), passes a predetermined distance to a pressure nip formed, for example, by cooperating pressure rolls (64 and 66). If desired, the fabric layers (52 and 56) can be spread apart or "opened" by 180.degree. So that the result approximates the configuration of a "french hem." Alternatively, if the two fabrics (52 and 56) that comprise the assembly are spread apart or opened by 360.degree., the result is a "reversed" seam.

But, Tolbert was to provide a finished appearance to a raw edge or selvage of a fabric. If desired, the fabric (80) can be directed to a fabric slitting apparatus (92), best illustrated in FIG. 10, to cut or remove any unfinished longitudinal edge portions of the fabric. The resultant finished fabric is thereafter directed to takeup roll (94).

While the present invention is in the first stage to glue PU gel and solvent to the backside of fastener strips (11,12) through a gluing step, then the solvent is vaporized through a drying step, in other words, the PU gel (37) is coated with the backside of the

fastener strips (11,12) in the first stage. And a 2~5 mils thick PU film (51) as wide as nylon zipper (10) (separated from a release paper) adhered to the PU gel (37) at the backside of the fastener strips. The film can be transparent to show textures or patterns thereunder, and the inner texture or pattern of the waterproof layer can prevent from scraping and have the function of counterfeit-proof. (please see page 13 lines 9-11). Until a cutting step (29) is executed, the original single sheet waterproof layer is cut into a left waterproof layer (17) and a right waterproof layer (18) (Please see page 10 lines 2-3).

Eightly, it is the same as “the fifthly” of this response.